Open Systems

Lessons Learned

March 2001

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Value of Open Systems

"Open Systems Architectures are the only way to go in designing C^{3}I systems. These architectures enable us to leverage commercial technology, to reduce support costs, and to continuously improve our war-fighting systems through product improvement. Only in clearly justified circumstances should we use either proprietary architectures or military only form factors for electronic equipment. I consider proprietary hardware and software to be a garbage game in most circumstances."

–Major General William H. Campbell, Program Executive Officer, Command, Control and Communications Systems

Open Systems Lessons Learned - 1

- **Addressing technology insertion at the beginning of the acquisition process provides a good opportunity to capture the open systems methodology, cost/benefits & lessons learned**
- **Place primary emphasis on interfaces & common services, *not* common modules for the acquisition community**
- **Government must understand and respect the contractor's business issues associated with changing an existing product to make it more "open"**
- **Industry must learn that Open Systems is a win-win situation and that workable business architectures can be developed jointly with the government**

Open Systems Lessons Learned - 2

- **C^4ISR and fighter aircraft avionics systems face many of the same Open Systems challenges -- issues addressed in architectures may differ**
- **Open Systems enable ease of upgrade, reduced testing, and long term viability via modularity**
- **Open Systems are necessary but not sufficient to achieve long-term :**
  - **Performance & Support**
  - **Affordability**
  - **Interoperability**
- **In the past, the open systems approach has largely been ad hoc**

Open Systems Lessons Learned - 3

- **Managers must ensure that an Open Systems Approach (OSA) is utilized in all cases and only documented exceptions are permitted.**
  - **The maximum appropriate use of OSA based system design should be used for all system material hardware and software development.**
  - **Facilitates significant cost avoidance as new technology becomes available to replace custom developed components.**
- **There are open systems design opportunities available for both hardware and software development at every tier of systems architecture (from the sub-component level to the component, subsystem, and system levels).**

Open Systems Lessons Learned - 4

"Disincentives"

- **Loss of absolute control—managers must rely upon other organizations for critical components and accept the risks associated with that reliance**
- **Little or no budget resources allocated to support technology transfer and/or receipt**
- **May have limited knowledge within the systems development staff of technology developments and needs**

COTS Lessons Learned - 1

- **Use existing products (COTS)**
  - **Don't push technology, follow it (cost/schedule/risk)**
  - **Use technology rolls to satisfy growth; don't count on new technology for baseline requirements**
- **DOD programs have limited influence on commercial developments**
  - **Extremely small quantity buys compared to industry**
- **COTS based components and standards can be major contributors to mitigating technology obsolescence**

COTS
Lessons Learned - 2

- **Use multiple metrics to identify problems**
- **Document and bound all requirements**
- **Troubleshooting transient problems is more difficult in a COTS environment**
- **Design and packaging must preserve COTS benefits**
- **Design must ensure multi-generational replacements within COTS product lines**

Summary

- **Processes & procedures are no substitute for a stable well trained workforce**

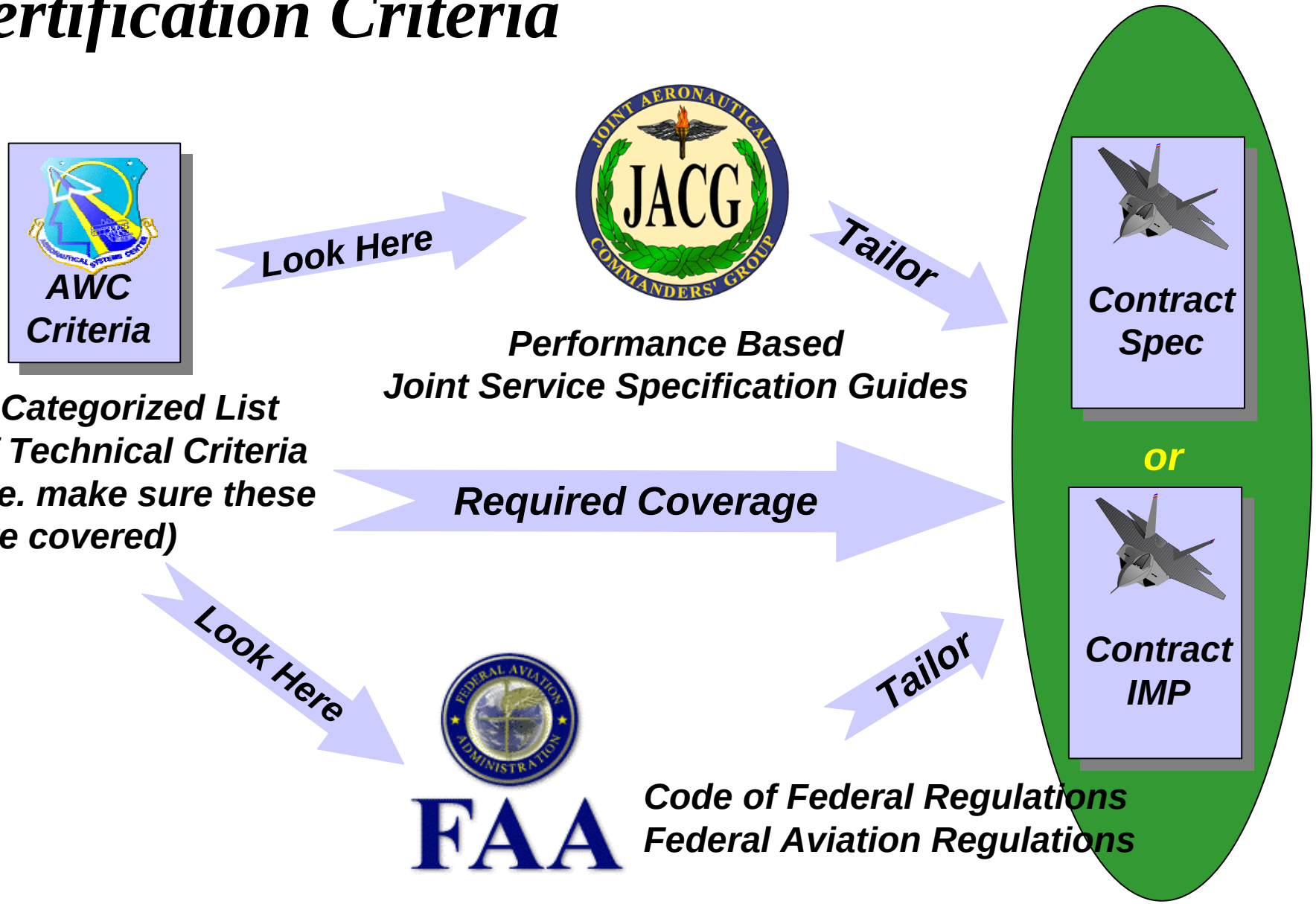
Backup Charts

Definition

Safety-Critical System

A computer, electronic or electromechanical system whose failure may cause injury or death to human beings. E.g. an aircraft or nuclear power station control system. (Common tools used in the design of safety-critical systems are redundancy and formal methods.)

Airworthiness Certification Criteria



Key Points of Contact

- **Open Systems Joint Task Force**
  - **P(703) 602-0851, F(703) 602-3560**
  - **Internet: http://www.acq.osd.mil/osjtf**
  - **Email: osjtf@acq.osd.mil**

- **The Open Group**
  - **Internet: http://www.opengroup.org**

Industry Points of Contact

- **Honeywell, Versatile Integrated Avionics (VIA)**
  - **Internet:** http://content.honeywell.com/das/via/via2_SF.htm
- **Computing Devices International, Integrated Avionic and Defense Computing Systems (Eurofighter)**
  - **Internet:** http://www.airforce-technology.com/contractors/computers/cdc
- **Systems Engineering Institute (SEI), Open Systems Approach**
  - **Internet:** http://www.sei.cmu.edu/opensystems/welcome.html
  - **Managing Software Acquisition: Open Systems and COTS Products, Dr. B. Craig Meyers and Patricia Oberndorf**